



UAVSAR Operational Processing and Data Delivery Status

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Introduction

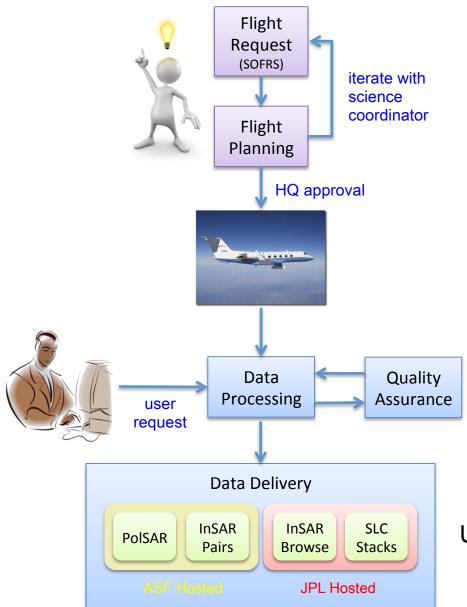


- Operational processor overview
- Data products and delivery status
 - PolSAR
 - InSAR Browse
 - InSAR Pair
 - SLC Stack
- FY15 processing improvements
- Future work



End-to-End Operations Overview



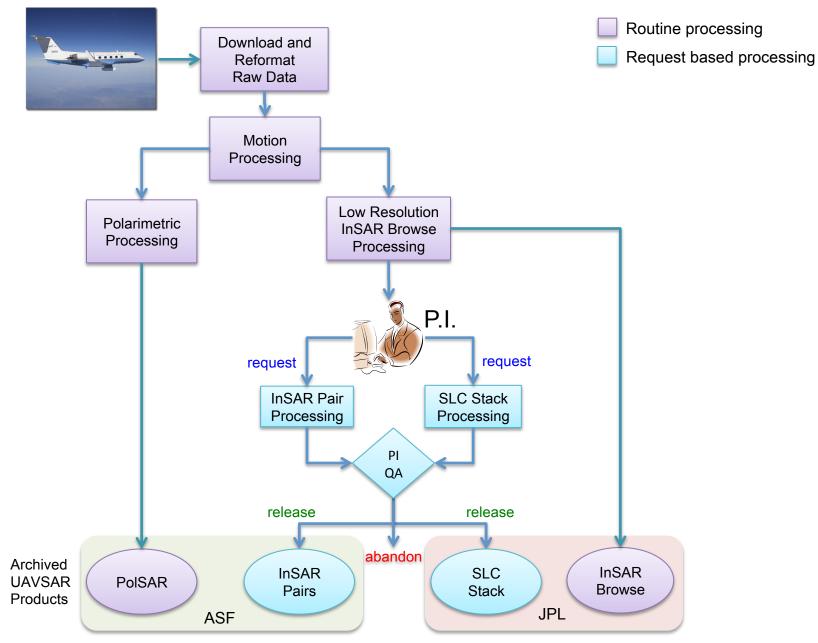


UAVSAR Data Products



Operational Processing Overview







PolSAR Products



- Slant range multi-looked cross products (.mlc)
 - real data: HHHH, HVHV, VVVV
 - complex data: HHHV, HVVH, HVVV
 - compressed stocks matrix (.dat)
 - 3 looks in range, 12 looks in azimuth
- Ground range products (.grd)
 - ground projected cross products
 - DEM used in projection (.hgt)
 - KML/KMZ files
 - incidence angle file (.inc)
 - slope file (.slope)
- Full resolution slant range single look complex data are available upon request (.slc)
 - 4 polarizations: HH, HV, VH, VV
- Annotation file of metadata



New Orleans levees April 8, 2014



InSAR Browse Products



Flight line ID: 25104

- Low resolution, zero-baseline, InSAR browse products in KML/KMZ format that help user quickly evaluate data and prioritize data requests
 - interferogram
 - coherence
 - amplitude of pass 1
 - amplitude of pass 2
 - range offsets
 - azimuth offsets
 - DEM used in ground projection
 - annotation file
 - data quality metrics
- No residual baseline correction applied
- No phase unwrapping

RP InSAR Browse image of Galapagos Islands, Ecuador (acquired Mar 14, 2013 and Mar 18, 2015) Status: Released Flight line comments; Galapagos volcanoes RPI lines. Line repeats for redundancy only, temporal baseline does not Flight request ID: 15G036 Download Data Quality Metrics Browse Image Browse Interferometric (InSAR) Data Format **(^)** Phase (radians) Display KML Browse HH Coherence <^>> Correlation Display KML Google Browse HH Amplitude Track 1 Download KMZ (75.0 MB Browse HH Amplitude Track 2 Download KMZ (75.1 MB) Download KML Browse HH Image Offsets in Azimuth Direction **(**\$) Azimuth Offsets (pixels Display KML

Product: GalVol 25104 13039-000 15023-004 0734d s01 L090 00 Favorite

2-year InSAR browse product of Sierra Negra volcano in the Galapagos shows meter level deformation



InSAR Browse Data Quality Metrics



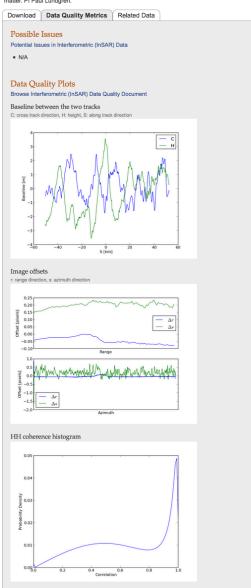
- baseline
- offset profiles in cross track and along track direction
- coherence histogram
- tube performance
- attitude
- velocity

allows for more informed evaluation of data

Product: GalVol_25104_13039-000_15023-004_0734d_s01_L090_00
RP InSAR Browse image of Galapagos Islands, Ecuador (acquired Mar 14, 2013 and Mar 18,
Flight line comments: Galapagos volcanoes RPI lines. Line repeats for redundancy only, temp
matter. PI Paul Lundgren.

Download Data Quality Metrics Related Data

Possible Issues







InSAR Pair Products



- Zero-baseline repeat pass interferometric products
 - slant range and ground range (binary & KML/KMZ)
 - interferogram (.int)
 - unwrapped phase* (.unw)
 - coherence (.cor)
 - amplitude 1 (.amp1)
 - amplitude 2 (.amp2)
 - DEM used in ground projection
 - annotation metadata file
- InSAR pair product is processed with or without residual baseline correction depending on PI choice

Product: ChiGla_12400_15029-009_15030-003_0002d_s01_L090_01 ★ Add to Favorites

RP InSAR Pair image of Glaciar Quetrupillan-Lanin, Chile/Argentina (acquired Mar 28, 2015 and Mar 30, 2015)
Flight line comments: Need to coordinate with Lundgren: This is very similar to lund04 122aa image swath - DataTake

Flight line comments: Need to coordinate with Lundgren: This is very similar to lund04_122aa image swath - DataTak 79.kmz, but longer to image 3 volcanic glaciers. Chile Glacier RPI line. Also in the SCIE-SCIE2 sortie. PI

This product: Version 1 (processor version c27b5882)

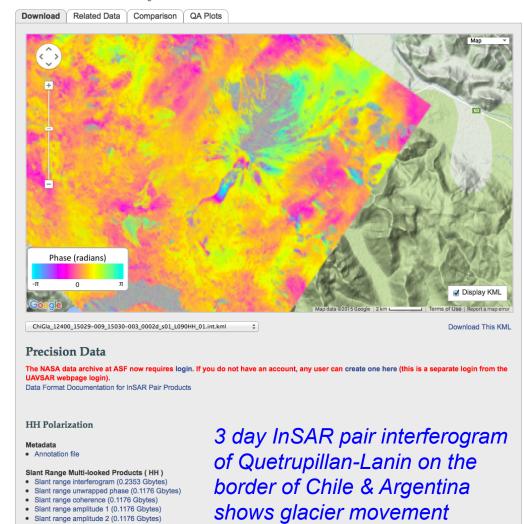
Ground Range Multi-looked Products (HH)

Ground range interferogram (1.1032 Gbytes)

Ground range unwrapped phase (0.5516 Gbytes)

Other versions: RP InSAR Browse Image

Instrument: L-band Flight line ID: 12400 Status: Released (ASF) Flight request ID: 15G036 Baseline: Corrected

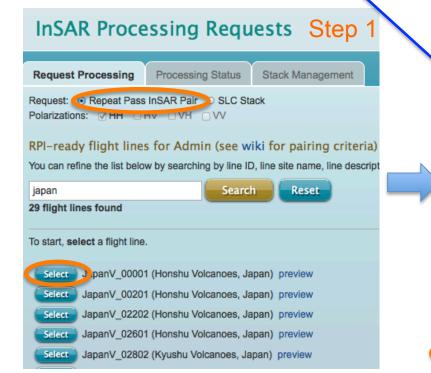


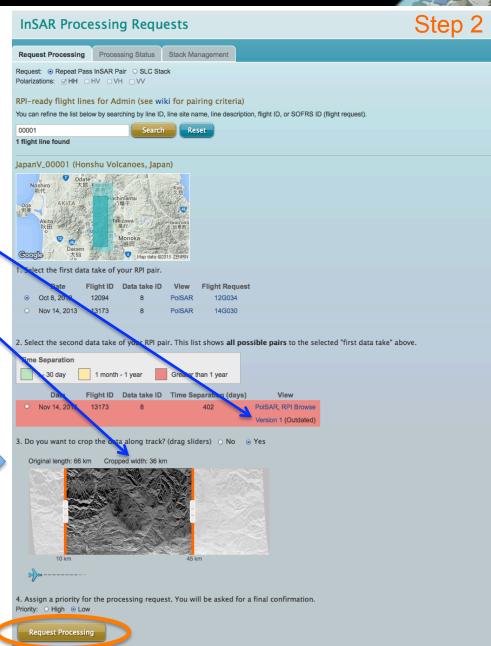


InSAR Pair Product Request Interface



- PIs request and review data using their UAVSAR account
- A single PI can order up to 50 products per week
- New features
 - request reprocessing of products processed with outdated processor versions
 - custom along track cropping



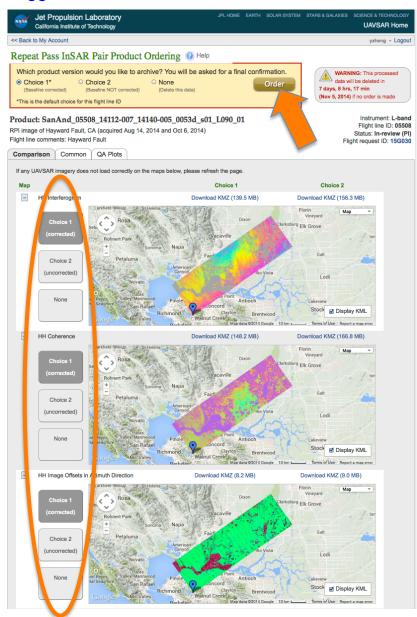




InSAR Pair Product Choice Page



Toggle choice buttons to see effects of baseline correction



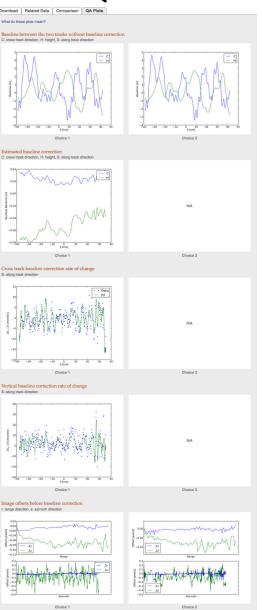
- review deadline clearly marked
- 3 email notifications alert PI that InSAR Pair product is ready for review

QA plots show



- baseline between the two tracks
- estimated baseline correction and rate of change
- range and azimuth offset profiles before and after baseline correction
- coherence histograms before and after baseline correction

QA Plots





SLC Stack Products



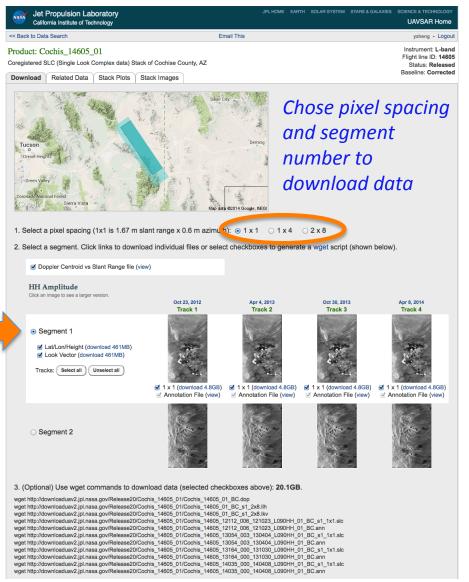
- Co-registered time series of single-look complex (SLC) data
- Data products
 - SLC files lat/lon/height (LLH) file annotation metadata file
 - Doppler file look vector (LKV)
- Choice of 1x1, 1x4, or 2x8 pixel spacing data
- Binary data are segmented into 40 km segments for manageable download
- Stack scenes are chronologically ordered by acquisition date
- PIs can choose between residual baseline corrected and uncorrected versions to be released to the public. Both versions are available to the PI through email link (in the future, the unchosen version will be deleted after 3 months)
- PIs can choose to enable and disable stacks from automatic scene addition
- PIs get 3 email notifications to QA data before the product is deleted
- Single PI can have up to 6 concurrent download sessions and is limited to 5-6 MB/ sec total download rate (benchmarked on JPL network)
- New features:
 - Custom along track cropping and scene selection
 - Automatic addition of newly acquired scenes that pass QA to enabled stacks
 - Discontinued stacks



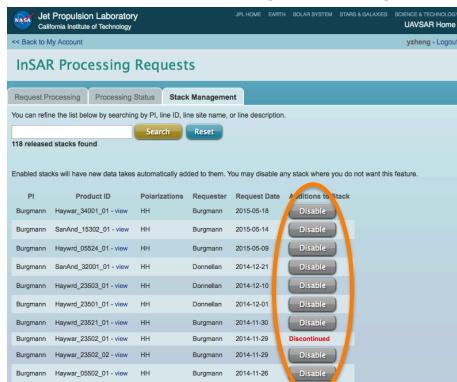
SLC Stack Product & Management Pages



Released SLC Stack Product Page



SLC Stack Management Page



Disabled stacks will not have new acquisitions automatically processed and added

Discontinued stacks cannot be enabled. All binary data are removed from archive after duplicate stack is released (new feature)

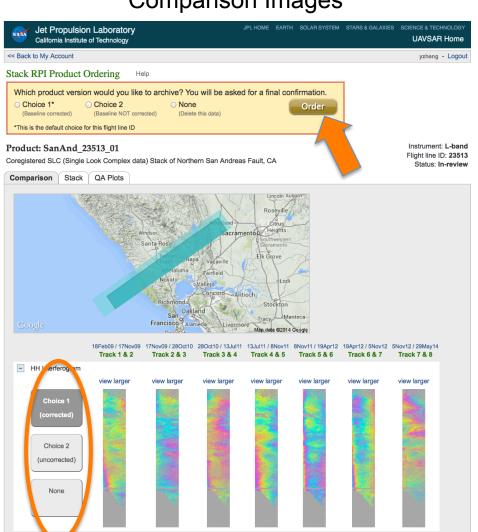


SLC Stack Review

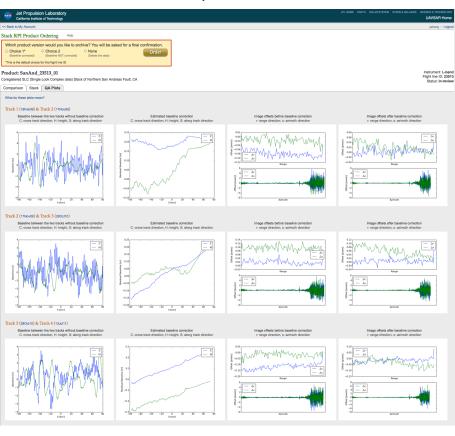


Review page: Sequential-pair interferograms are shown, along with coherence and offset maps. PI does product QA using these thumbnail images and QA Plots. Same review deadlines as InSAR Pairs products.

Comparison Images



QA Plots

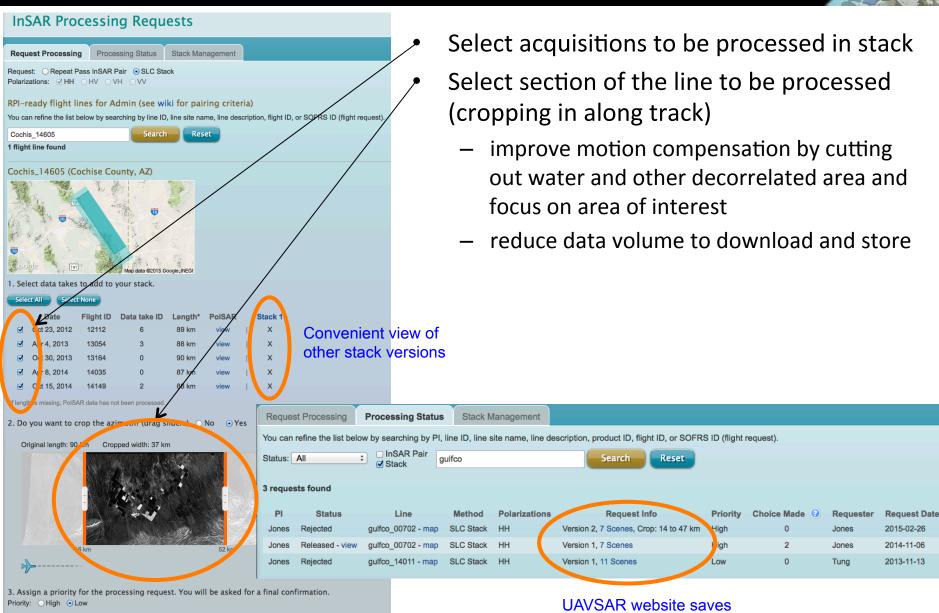




Request Processing

New Custom Stack Request Interface





UAVSAR website saves selected cropping



FY15 Processing Improvements Summary



Request-based processing

- Enabled custom along track cropping for InSAR pair and SLC stack requests
- Gave PIs the ability to request reprocessing of released products when significant new processor improvements are available (for example: residual baseline correction algorithm)
- Implemented Polarimetric interferometric processing and interface
- SLC Stack improvements
 - Added custom scene selection for SLC stacks
 - Automated addition of newly acquired scenes to enabled stack
 - Added feature to discontinue stacks

New data flow features

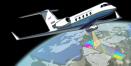
- Added automated processing restart feature that detects resource related job crashes and automatically re-launch jobs at the last processing stage
- Improved Emergency response data flow to streamline single product processing for faster processing time
- Implemented storing raw data on Ames supercomputer to speed up processing

• Other improvements

- Added ability to indicate favorite data products in UAVSAR user accounts
- Implemented changes to avoid jobs expiring during holidays of Thanksgiving, Christmas, and July 4th



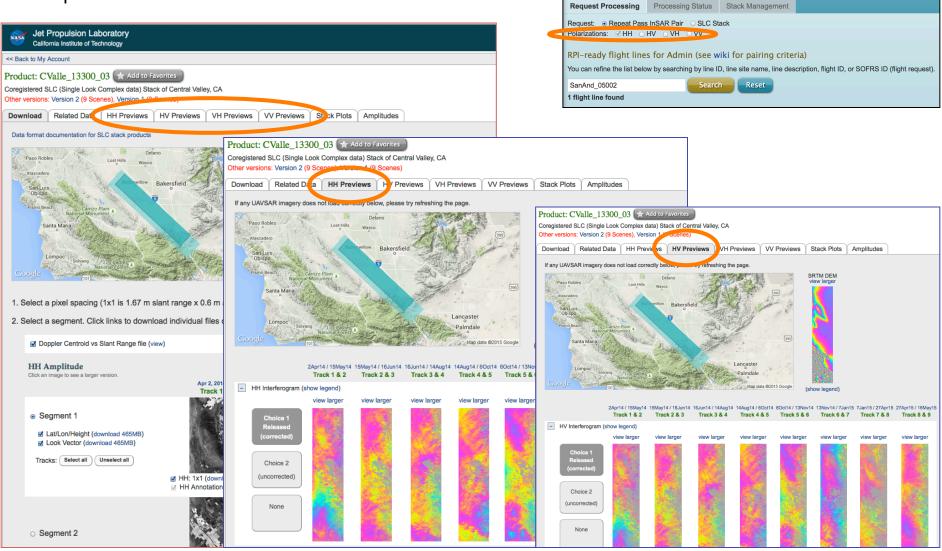
Polarimetric Interferometric Processing



Quad-pol Interferometric processing (including InSAR Pairs and SLC Stacks) is ready for public release

InSAR Processing Requests

- co-registered SLCs for all 4 polarizations
- all polarizations use HH residual baseline correction results



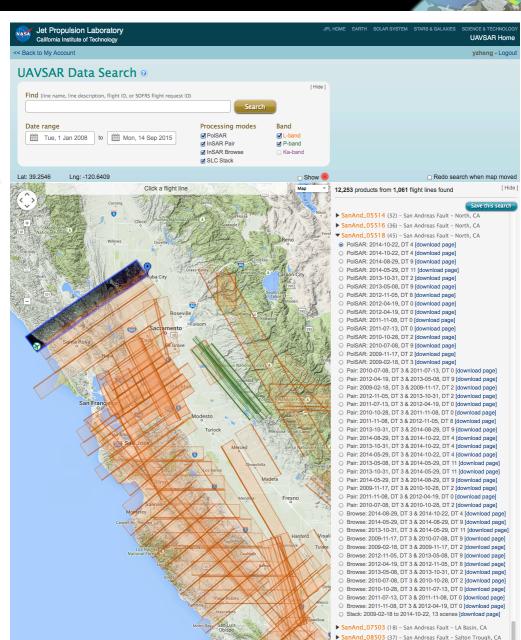


New Endeavors



nAnd 08504 (48) - San Andreas Fault - Salton Trough, CA

- New UAVSAR data search page
 - Two panel view that simultaneously shows map and product list
 - KML image loads directly on Google Map
 - Product search by date range
 - Full product list available while searching
 - Products color coded by band
 - Plus more!
- Further improvements in residual baseline correction
- Non-PI processing request process





Science Product Delivery Status



Product Type	Total Products Delivered	FY15 Products Delivered	FY15 Processing Latency (days)
PolSAR	5,027	906	23
InSAR Browse	3,432	435	20
InSAR Pair	1,940	852	15
SLC Stack	143	135	47

- Processing latency for InSAR browse and SLC stack products decreased significantly from FY14
- SLC Stack demand and processing increased significantly in FY15



Summary



- FY15 data delivery numbers remain very high due to further efforts to increase automation and data flow efficiency
- Implemented custom processing request features to give PIs more flexibility in processing to improve data quality and reduce unnecessary data volume for download and archive
- Focused mainly on SLC stack processing improvements due to major increased demand and unique features of stack products





Thank You!